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Reestablishment, new records, and a key for the species of *Aspidosperma* (Apocynaceae) from the Brazilian Amazon

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ABSTRACT

As a result of systematic study of the Neotropical genus *Aspidosperma* (Apocynaceae), we reestablish the species *A. centrale* and *A. duckei*, and report *A. steinbachii* and *A. tambopatense* as new records for Brazil. We provide taxonomic descriptions of these species along with plates, distribution maps, and information on their conservation status, habitat and phenology. We also provide an identification key for all the species of *Aspidosperma* from the Brazilian Amazon.

Keywords: Aspidospermeae, distribution, Neotropics, South America, taxonomy

Introduction

Aspidosperma Mart. & Zucc. (Apocynaceae) is the largest genus of the tribe Aspidospermeae Miers, and belongs to the rauvolfioid grade (Endress *et al.* 2014; Simões *et al.* 2007; 2016). The genus has a Neotropical distribution, occurring from Mexico to Argentina (except Chile), and currently comprises 64 species (Marcondes-Ferreira 1999; Morales & Zamora 2017; Pereira *et al.* 2016; 2017; Scudeler *et al.* 2018; Brazilian Flora 2020 under construction). The genus can be recognized by having the following: arboreal or shrubby habit, usually whitish or reddish (rarely colorless) latex, usually alternate (rarely opposite or whorled) leaves, flowers with slightly-differentiated style-head, woody follicles, and winged seeds (Woodson 1951; Marcondes-Ferreira 1988; Machate *et al.* 2016; Pereira *et al.* 2016).

Aspidosperma is one of the most important genera of Apocynaceae in Brazil, due to its ecological, economic (mainly for its timber) and medicinal value (Duarte 1970; Marcondes-Ferreira 1988; Pereira *et al.* 2016). Fifty-six species of *Aspidosperma* are reported to occur in Brazil (23 endemic), which makes it the country with the greatest diversity of species (Morales & Zamora 2017; Brazilian Flora 2020 under construction). Species of *Aspidosperma* occur in almost all Brazilian phytogeographic domains (the exception being the southern grasslands, known as *Pampas*), with a primary center of diversity in the Amazon (31 spp.) (Brazilian Flora 2020 under construction).

Although *Aspidosperma* is a well-studied genus (e.g., Candolle 1844; Müller-Argoviensis 1860; Schumann 1895; Pichon 1947; Woodson 1951; Marcondes-Ferreira 1988; Marcondes-Ferreira & Kinoshita 1996; Potgieter 1999), the circumscription of some species remains unclear and the genus is considered one of the most taxonomically difficult among Neotropical Apocynaceae (Morales & Zamora 2017). Recent taxonomic studies have been performed on species of *Aspidosperma* from Brazil (Machate *et al.* 2016; Pereira *et al.* 2016), with three new species being described for the genus (Morales & Zamora 2017; Pereira *et al.* 2017; Scudeler *et al.* 2018).

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During ongoing studies with *Aspidosperma*, we found that *A. centrale* Markgr. and *A. duckei* Huber ex Ducke should be reestablished, and confirmed the first records of *A. steinbachii* Markgr. and *A. tambopatense* A.H.Gentry in Brazil. Thus, we aim to present updated taxonomic descriptions, plates and distribution maps for these species, and provide information on their conservation, habitat and phenology. In addition, since these species are restricted to the Amazon phytogeographic domain, we provide an identification key for the species of *Aspidosperma* from the Brazilian Amazon.

Materials and methods

The study was based on material from the herbaria collections of CEN, ESA, IAN, INPA, MG, R, RB, SPF and UEC [acronyms according to Thiers (2018)], and images of material from the databases Atrium Biodiversity Information System (herbarium CUZ) (AABP Atrium 2018), FMNH Botany Collections (herbarium F) (FMNH 2012), and INCT-Virtual Herbarium of Flora and Fungi (herbaria NY and RON) (speciesLink 2018). Species identifications were confirmed through the analysis of protologues and types, or images of types available at JSTOR Global Plants website (herbaria E, G, K, L, P, PH, S, TDC and U) (Ithaka 2018), and other online collections (herbaria A, GH and MO).

Material was measured using a digital caliper and the software ImageJ (Abràmoff *et al.* 2004). Vegetative and reproductive structures were observed under a stereomicroscope. The terminology used follows Woodson (1951), Radford *et al.* (1974) and Marcondes-Ferreira (1988). Data on distribution, habitat and phenology were obtained from herbarium vouchers and field notes. Information on leaf and fruit coloring is based on dried material. Distribution maps were created using ArcGis 10.1 (ESRI 2012) using only confirmed occurrences. We assessed the conservation status of the species in Brazil using the GeoCAT tool (Bachman *et al.* 2011), while the area of occupancy (AOO) was based on the default cell width (2 km), as recommended by the IUCN Red List guidelines (IUCN 2017).

Taxonomic treatment

Reestablishment of ***Aspidosperma centrale*** and ***A. duckei***

Aspidosperma centrale and *A. duckei* were considered synonyms of other taxa by the last two revisions of the genus (Woodson 1951; Marcondes-Ferreira 1988). As a result of our ongoing research with *Aspidosperma*, we have come to accept these species, and thus provide updated descriptions with taxonomic and nomenclatural notes.

1. *Aspidosperma centrale* Markgr., Notizbl. Bot. Gart. Berlin-Dahlem 12(115): 560. 1935. Type: BRAZIL. Amazonas: Parintins, Lago José-Assú, mata de terra firme, 16/IX/1932, *A. Ducke s.n.* (lectotype: RB! [No. 24571, barcode RB00535019], designated here; isolectotype: RB! [fragment] [No. 24571, barcode RB00535147]).

Figs. 1, 2.

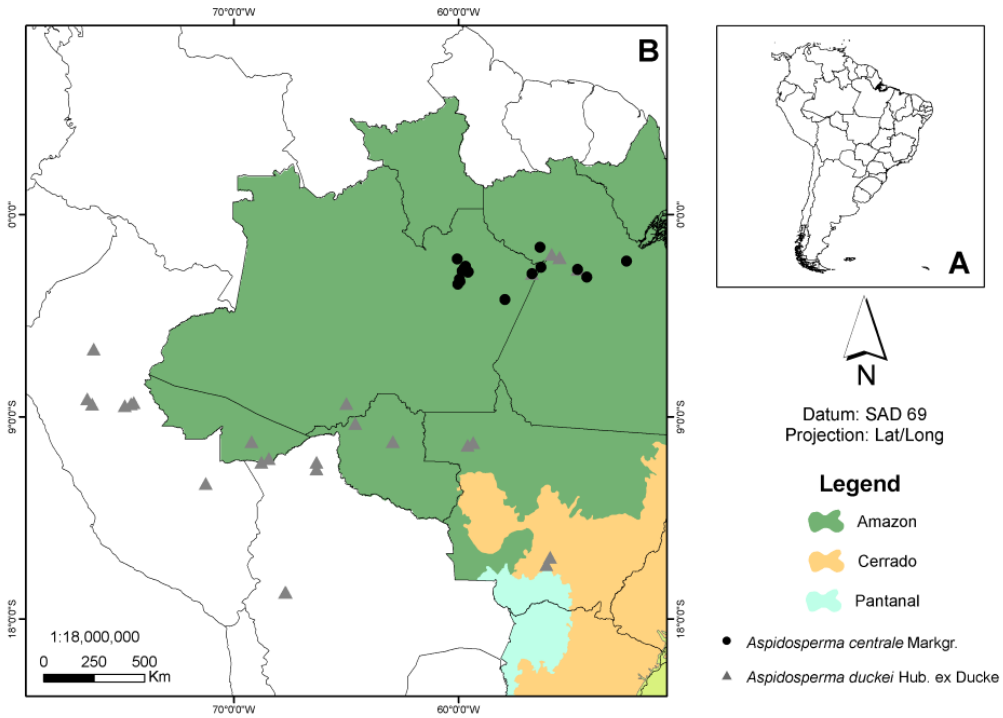

Figure 1. Map indicating (A) South America and (B) the distribution of *Aspidosperma centrale* Markgr. and *A. duckei* Huber ex Ducke.

Trees 12-39.5 m high; trunk straight. Branches cylindrical, slightly suberous, sparsely lenticellate, pubescent to glabrescent, brown or gray, without cataphylls; latex red. Leaves alternate, distributed along the branches; petioles 1.2-2 cm long, flattened on the adaxial surface, not winged, pubescent to glabrous; blades 7.11-17.5 × 2-6.9 cm, coriaceous, flattened, oblong or obovate, apex acute, obtuse or retuse, base attenuate or oblique, margin entire, base and margin revolute, discolorous, venation craspedodromous, adaxial surface dull or lustrous, dark brown, pubescent to glabrescent, primary vein immersed or flattened, secondary veins immersed, tertiary veins inconspicuous, abaxial surface dull, white, velutinous, primary vein prominent, secondary veins prominulous, 18-25 pairs, tertiary veins inconspicuous. Inflorescences 9.21-11.7 cm long, terminal or axillary, cyme corymbiform, rigid, tomentose. Flower

Figure 2. *Aspidosperma centrale* Markgr. **A.** reproductive branch; **B.** flower; **C.** inner part of corolla tube; **D.** detail of gynoecium; **E.** follicle [Photos. A: J. R. Nascimento *et al*. 553 (NY-photo); B-D: E. Soares 221 (INPA); E: C. V. Castilho *et al*. 83 (INPA)].

buds with corolla lobes twisted. Flowers 6.5-7.1 mm long; pedicel 0.7-0.9 × 1 mm long, tomentose. Calyx 1.7-2 × 1.5-1.7 mm, campanulate, green, without colleters, tomentose externally, tomentose at the apex internally; lobes 5, 1 × 0.7-1 mm, equal, deltoid, apex acute. Corolla 5-6 × 1-1.5 mm, salverform, yellow; tube 2.5-3.2 mm long, wall not thickened at the mouth, glabrous externally, canescent below the insertion of the anthers internally; lobes 5, 2.5-3 × 0.4 mm, erect, filiform, apex acute, glabrescent. Stamens 5, 2.2 mm long, included; filaments adnated to the corolla tube, 1.7 mm long, canescent; anthers 0.5 mm long, free from each other and from the style-head, positioned above the style-head, ovate, apex acute or apiculate, base cordate. Carpels 2, 1.4-1.6 mm long; ovary 0.5-0.7 × 0.7 mm, superior, hemisyncarpous, globoid, glabrous; style 0.5 mm long, cylindrical; style-head 0.4 mm long, main body globoid, with 2 apical appendages, ca. 0.2 mm long, glabrous. Follicles 2 or 1 by abortion, 10.5-13.1 × 5.5-8.2 cm, flattened, dolabriform or suborbicular, sulcate, stipitate, mucronate, midrib conspicuous, lenticels inconspicuous, brown, pubescent to glabrescent. Seeds 6-6.6 cm diam., winged, orbicular, yellow, glabrous; seminal nucleus central, without radial lines, nucleus 2.6 cm diam.

Material examined: BRAZIL. Amazonas: Manaus, Distrito Agropecuário, 90 km NNE de Manaus, Reserva 1501 (km 41), 6/XII/1991, *A. A. Oliveira et al. 261* (INPA, SPF); Manaus, Reserva Florestal Ducke, próximo ao Igarapé Sempre Viva, 26/IX/1957, *E. Ferreira 109-57* (INPA); Manaus, Reserva Florestal Ducke, Manaus-Itacoatiara, km 26, 26/VII/1994, *J. R. Nascimento et al. 553* (INPA, NY-photo, SPF); Manaus, Reserva Florestal Adolfo Ducke, Rodovia Manaus-Itacoatiara, km 26, trilha L-O7, km 3,5, *C. V. Castilho et al. 83* (INPA); Maués, along Rio Apoquitaua, just above mouth of Rio Pacoval, 27/VII/1983, *J. L. Zarucchi 3210* (INPA); Presidente Figueiredo, Rio Urubu, Cachoeira de Iracema, 22/IX/1949, *R. L. Fróes 25361* (INPA, NY-photo). Pará: Oriximiná, Porto Trombetas, próximo à área industrial, 9/X/1986, *E. Soares 221* (INPA); Porto de Moz, Rio Xingu, margem esquerda do rio, região onde foi feito um levantamento estatístico florestal pelo IAN, SPVEA e FAO, 18/IX/1955, *R. L. Fróes 32377* (IAN); Santarém, Reserva Florestal de Curuá-Una, Planalto Alto II a 1,5 km do Flanco, 7/X/1963, *Tressel 22* (INPA).

Distribution and habitat: *Aspidosperma centrale* occurs in Brazil and Colombia. In Brazil, it is found in the North Region (states of Amazonas and Pará), occurring in forests on hilly terrain (*terra firme* forest) in the Amazon rainforest.

Phenology: Flowers from April to September and fruits from July to December.

Conservation status: *Aspidosperma centrale* has an AOO of 68 km^2 and is considered endangered according to IUCN guidelines (IUCN 2017). It has 16 confirmed records for Brazil (.kml file available at https://figshare.com/s/81cefc2ee83949c54a21).

Nomenclatural notes: Among the four materials reported by Markgraf (1935) in the protologue of *Aspidosperma centrale*, Woodson (1951) selected "Ducke 21593" from herbaria U and US as the lectotype. However, this material should not have been chosen as a lectotype since Markgraf indicated "Ducke 24571" as the type using the phrase "Original der Art". Additionally, the number "24571" is not the collector number of A. Ducke, but rather the catalog number of two specimens in herbarium RB (No. 24571, barcodes RB00535019 and RB00535147). Therefore, the collections from herbarium RB with the catalog number "24571" must be considered the type material of *Aspidosperma centrale*. To avoid confusion, we elected one of these types as a lectotype, and choose the material "Ducke s.n.", RB No. "24571" with barcode "RB00535019", because it was the best preserved.

Taxonomic notes: *Aspidosperma centrale* was synonymized with *A. album* (Vahl) Benoist ex Pichon by Woodson (1951), but later Marcondes-Ferreira (1988) considered it a synonym of *A. spruceanum* Benth. ex Müll.Arg. Here, due to observed differences, we are accepting *Aspidosperma centrale*. This species resembles two Amazonian species, *Aspidosperma sandwithianum* Markgr. and *A. spruceanum*, mainly in leaf characteristics, but differs from *A. sandwithianum* by having smaller (ca. 1.2-2 vs. ca. 2.2-4 cm long), and pubescent to glabrous (vs. tomentose) petioles, and by flowers with corolla tube canescent below the insertion of the anthers internally (vs. tomentose). Furthermore, *Aspidosperma centrale* differs from *A. spruceanum* by having leaves with secondary veins immersed on the adaxial surface (vs. prominulous or flattened), flowers with smaller pedicels (0.7-0.9 vs. 3.7-4 mm long), and brown follicles (vs. yellow).

2. *Aspidosperma duckei* Huber ex Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 244. 1922. Type: BRAZIL. Pará: Óbidos, Serra da Escama, 22/IX/1910, *A. Ducke s.n.* (lectotype: MG! [barcode MG011040], designated by Woodson (1951: 139); isolectotypes: G [barcode G00169271] [digital image!], R! [barcode R000002228], RB! [No. 15815, barcode RB00535035]).

Figs. 1, 3.

Trees 10-40 m high; trunk straight. Branches cylindrical, not suberous, sparsely lenticellate, glabrescent, brown, without cataphylls; latex white. Leaves alternate, distributed along the branches; petioles 1.4-2.9 cm long, flattened on the adaxial surface, not winged, pubescent to glabrous; blades 6.7-17.3 × 3.7-8.3 cm, chartaceous, flattened, elliptic or obovate, apex acute or acuminate, base cuneate or oblique, margin entire, base and margin flattened, discolorous, venation eucamptodromous, adaxial surface dull, dark brown, glabrescent, primary vein immersed, secondary veins immersed, tertiary veins inconspicuous, abaxial surface dull, light brown, glabrescent, primary vein prominent, secondary veins prominent, 12-17 pairs, tertiary veins inconspicuous. Inflorescences ca. 4 cm long, subterminal,

cyme corymbiform, rigid, tomentose. Flower buds with corolla lobes not twisted. Flowers 19-21 mm long; pedicel 2.5-3.1 × 0.6-1.2 mm long, tomentose. Calyx 2.2-3 × 2-2.7 mm, campanulate, green, without colleters, tomentose externally, glabrous internally; lobes 5, 1.8-2.2 × 0.8-1 mm, equal, deltoid or triangular, apex acute. Corolla 14.8-18.4 × 1.9-2.5 mm, salverform, white; tube 6.9-7.4 mm long, wall thickened at the mouth, tomentose externally, glabrescent internally; lobes 5, 7.9-11 × 2-2.8 mm, patent, oblong, apex rounded, tomentose. Stamens 5, 4.6-6.7 mm long, included; filaments adnated to the corolla tube, 3.4-5.2 mm long, glabrescent; anthers 1.2-1.5 mm long, free from each other and from the style-head, positioned above the style-head, ovate, apex apiculate, base cordate. Carpels 2, 2.9-3.2 mm long; ovary 0.76-1.1 × 0.6-1.4 mm, superior, hemisyncarpous, globoid, tomentose; style 1.4-

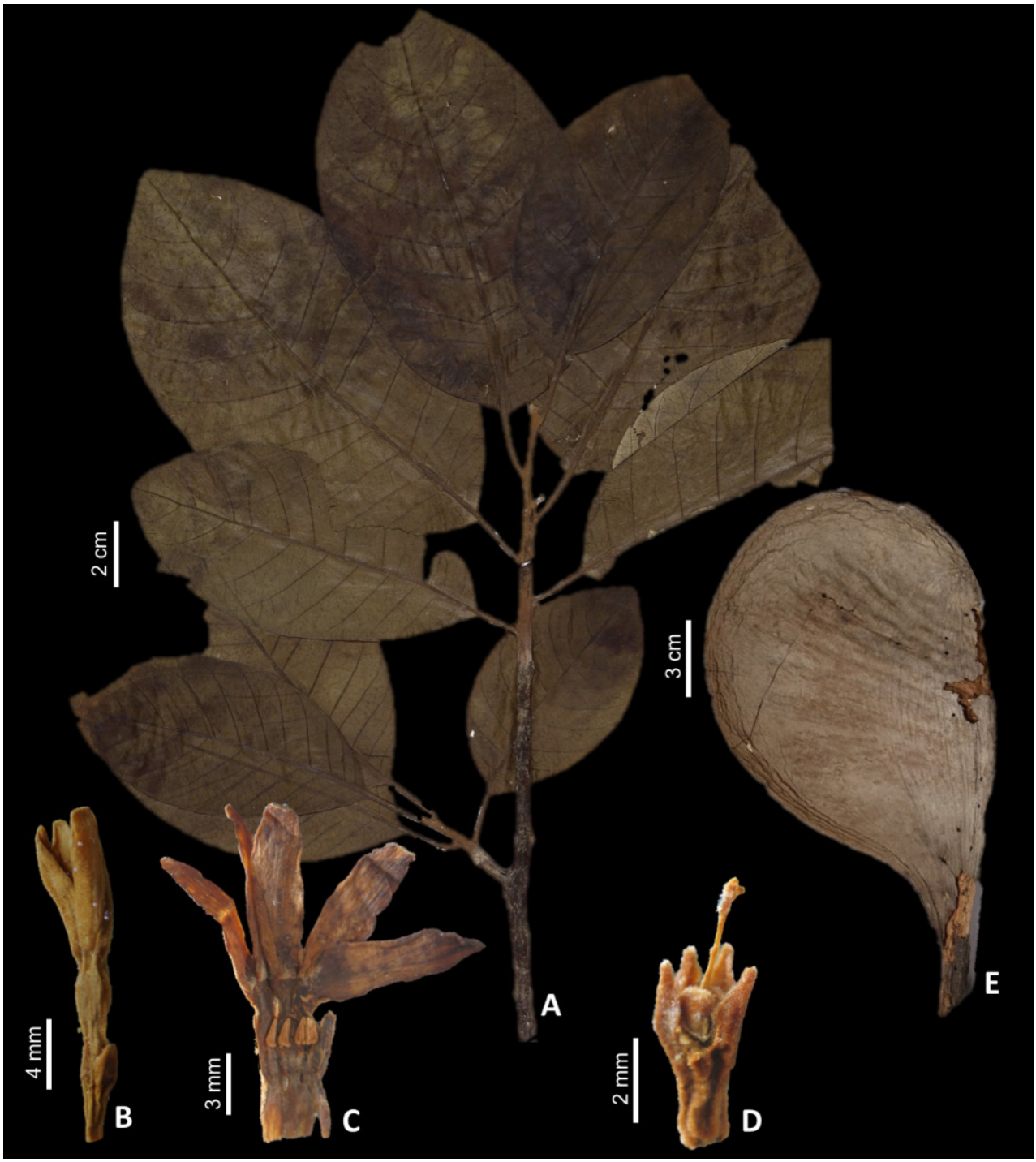

Figure 3. *Aspidosperma duckei* Huber ex Ducke. **A.** branch; **B.** flower; **C.** inner part of corolla tube; **D.** detail of calyx and gynoecium; **E.** follicle [Photos. A-D: A. Ducke s.n. (RB No. 11402); E: A. A. Santos 3641 (RB)].

1.9 mm long, cylindrical; style-head 0.6-0.7 mm long, main body globoid, with 2 apical appendages, ca. 0.3 mm long, glabrous. Follicles 2 or 1 by abortion, 20.1-25.2 × 11.3-13.8 cm, flattened, dolabriform, smooth, stipitate, mucronate, midrib inconspicuous, lenticels inconspicuous, brown, glabrescent. Seeds 8.3-9.7 cm diam., winged, orbicular, yellow, glabrous; seminal nucleus central, without radial lines, nucleus 2.8 cm diam.

Material examined: BRAZIL. Acre: Cruzeiro do Sul, margem esquerda, do Rio Juruá, Igarapé Viseu, 21/III/1992, *C. A. Cid Ferreira et al. 10882* (INPA). Amazonas: Parintins, 30/VIII/1932, *A. Ducke s.n.* (RB No. 24574). Mato Grosso: Aripuanã, Gleba Aripuanã a 25 km da cidade em direção sudoeste, 5/VII/1997, *G. F. Árbocz et al. 4180* (ESA, UEC). Pará: Óbidos, 20/X/1919, *A. Ducke s.n.* (RB No. 11402); Oriximiná, Mineração Rio do Norte, próximo à Vila Madezati, 17/VIII/1989, *E. Soares 522* (INPA); Santarém, estrada de Belterra, 6/X/1962, *A. P. Duarte 7016* (RB). Rondônia: Ariquemes, 21 km SE of Ariquemes on hwy. BR-364, then 1 km E on "Linea 45", 17/III/1987, *M. Nee 34422* (INPA); Porto Velho, BR-364 sentido Jaci Paraná-Abunã, 20/VI/2012, *A. A. Santos 3641* (RB).

Additional material examined: PERU. Madre de Dios: Manu, 10/IX/1989, *R. B. Foster & S. H. Beltran 13158* (UEC).

Distribution and habitat: *Aspidosperma duckei* occurs in Bolivia, Brazil and Peru. In Brazil, it is found in the North (states of Acre, Amazonas and Rondônia) and in the Central West (state of Mato Grosso) Regions, occurring in forests on hilly terrain (*terra firme* forest) in the Amazon rainforest, and in the transition zone between the Amazon and the *Cerrado*.

Phenology: Flowers from September to October and fruits from September to May.

Conservation status: *Aspidosperma duckei* has an AOO of 108 km^2 and is considered endangered according to IUCN guidelines (IUCN 2017). It has 19 confirmed records for Brazil (.kml file available at https://figshare.com/s/0b298a757a82f5315dba).

Nomenclatural notes: Woodson (1951) designated the material "Ducke 11040" deposited in herbaria G, P and US as the lectotype, which is one of the five gatherings mentioned by Ducke (1922) in the protologue of *Aspidosperma duckei*. However, most of the numbers of Ducke's collections are known to actually be catalog numbers of herbaria MG or RB. In the present case, Ducke mentioned in the introduction of the publication that specimen numbers indicate the catalog numbers of the herbarium MG. Thus, the lectotype designated by Woodson is actually "Ducke s.n.", and refers to the specimen deposited in MG (barcode MG011040).

Taxonomic notes: *Aspidosperma duckei* was considered a synonym of *A. macrocarpon* Mart. & Zucc. by Woodson (1951) and Marcondes-Ferreira (1988). However, Duarte (1970), in a preliminary version of what would be a new revision for the genus, gave indications that *Aspidosperma duckei* could be a "good species", distinguishing it from *A. macrocarpon* by its larger petioles and fruit stipes, and by its tomentose ovary (vs. glabrous). Here, we agree with Duarte and accept *Aspidosperma duckei*.

New records for Brazil

Our research revealed that the records for *Aspidosperma steinbachii* and *A. tambopatense* are new for Brazil. *Aspidosperma steinbachii* was accepted by Woodson (1951), but Marcondes-Ferreira (1988) synonymized this species and *A. tambopatense* with *A. spruceanum* and *A. parvifolium* A.DC., respectively. However, since Marcondes-Ferreira's revision was not actually published, both species remain accepted, which is supported by our observations of morphological characteristics.

1. *Aspidosperma steinbachii* Markgr., Notizbl. Bot. Gart. Berlin-Dahlem 9(90): 1158. 1927. Type: BOLIVIA. Santa Cruz: Sara, bosques de Buena Vista, 450 m, 2/X/1925, *J. Steinbach 7261* (lectotype: K [barcode K000587712] [digital image!], designated here; isolectotypes: A [barcode 00057226] [digital image!], E [barcode E00259701] [digital image!], F [barcode V0092485F] [digital image!], G [barcode G00169334] [digital image!], GH [barcode 00057227] [digital image!], MO, NY [barcode 00297995] [digital image!], PH [No. 653008, barcode PH00004864] [digital image!], RB! [fragment] [No. 452001, barcode RB00535084], S [No. S04-1797] [digital image!], U [barcode U0000491] [digital image!]; photo: F [No. negative 4431] [digital image!]).

Figs. 4, 5.

Trees 6-15 m high; trunk straight. Branches cylindrical, not suberous, sparsely lenticellate, pubescent to glabrescent, brown or black, without cataphylls; latex red. Leaves alternate, distributed along the branches; petioles 1.5-3.1 cm long, flattened on the adaxial surface, not winged, tomentose to pubescent; blades 10-16 × 3-4.7 cm, chartaceous, flattened, oblong or elliptic, apex acute or acuminate, base cuneate, attenuate or oblique, margin entire, base and margin frequently revolute, discolorous, venation craspedodromous, adaxial surface dull or lustrous, dark brown, glabrous, primary vein prominulous, secondary veins prominent or prominulous, tertiary veins inconspicuous, abaxial surface dull, light brown, pubescent to glabrous, primary vein prominulous, secondary veins prominent or prominulous, 25-30 pairs, tertiary veins inconspicuous. Inflorescences 10.3-12 cm long, terminal or axillary, cyme corymbiform, not rigid, tomentose. Flower buds with corolla lobes twisted. Flowers 7-9.5 mm long; pedicel 1-2.5 × 1 mm long, tomentose. Calyx 3.5-3.8 × 2 mm, campanulate, green, without colleters, tomentose on both surfaces; lobes 5, 2.5-3.2 × 1-1.3 mm, equal, deltoid or ovoid, apex acute or obtuse. Corolla 4.5-5.5 × 1-1.2 mm, salverform, yellow; tube 3 mm long, wall not thickened at the mouth, glabrous externally, pubescent below the insertion of the anthers internally; lobes 5, 1.5-2.5 × 0.5 mm, erect, filiform, apex acute, glabrescent. Stamens 5,

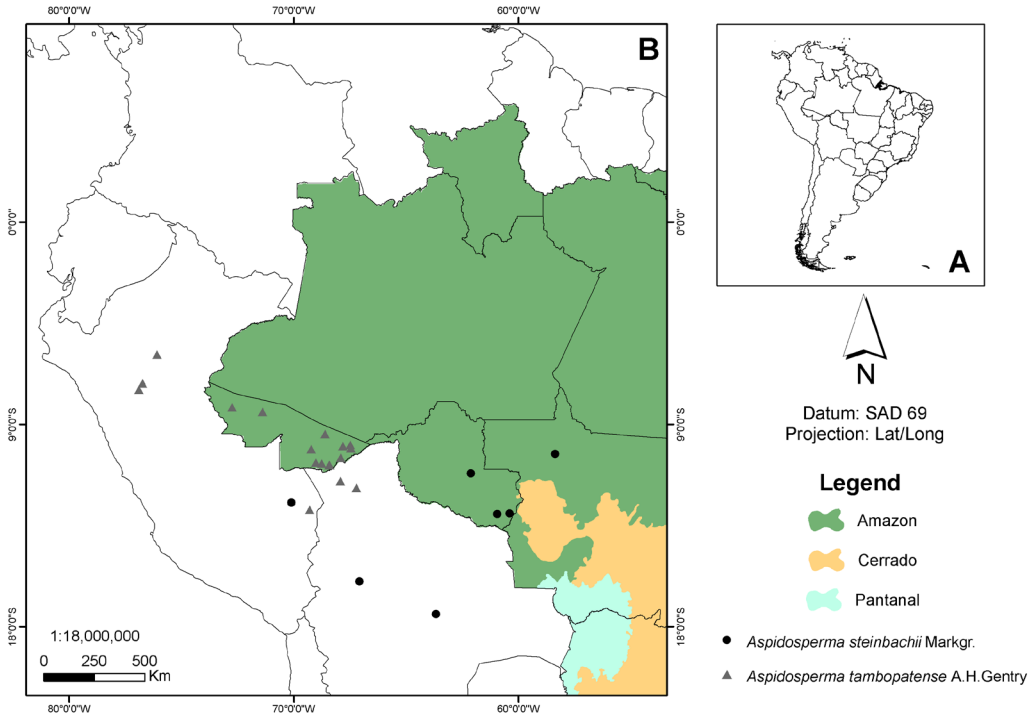

Figure 4. Map indicating (**A**) South America and (**B**) the distribution of *Aspidosperma steinbachii* Markgr. and *A. tambopatense* A.H.Gentry.

2-2.4 mm long, included; filaments adnated to the corolla tube, 1.6-2 mm long, pubescent; anthers 0.4 mm long, free from each other and from the style-head, positioned above the style-head, ovate, apex acute or obtuse, base cordate. Carpels 2, 1.7-1.95 mm long; ovary 0.5 × 0.7 mm, superior, hemisyncarpous, ovoid, glabrous; style 0.5-0.75 mm long, cylindrical; style-head 0.7 mm long, main body globoid, with 2 apical appendages, ca. 0.2 mm long, pubescent to glabrescent. Follicles 2 or 1 by abortion, 7-7.11 × 3.55-3.78 cm, flattened, dolabriform or suborbicular, sulcate, stipitate, mucronate, midrib conspicuous, lenticels inconspicuous, blackish-green, velutinous. Seeds 5.8 cm diam., winged, orbicular, yellow, glabrous; seminal nucleus central, without radial lines, nucleus 1.5-2 cm diam.

Material examined: BRAZIL. Mato Grosso: Juruena, Rio Juruena, arredores da cidade, 13/VII/1977, *M. G. Silva & J. Maria 3325* (IAN, MG, RB, SPF). Rondônia: Corumbiara, 21/XII/1996, *H. S. Pereira & C. R. Souza 2112-084-1996* (RON-photo); Porto Velho, estrada para Alvorada, linha 5, beira de estrada, 29/IX/2013, *N. C. Bigio et al. 1101* (RB, RON-photo); Vilhena, no meio do pasto, ponto 1220, 6/XII/2013, *N. C. Bigio et al. 1231* (RON-photo).

Additional material examined: BOLIVIA. La Paz: Province of S. Yungas, basin of Rio Bopi, San Bartolome (near Calisaya), 1-22/VII/1939, *B. A. Krukoff 10290* (NY-photo). Santa Cruz: Sara, Buenavista, 27/XI/1925, *J. Steinbach 7356a* (F-negative). PERU. Madre de Dios: Manu province, Río Los Amigos II, 14/VI/1995, *P. Núñez et al. 16862* (CUZ-photo).

Distribution and habitat: *Aspidosperma steinbachii* was initially described with a distribution restricted to Bolivia (Markgraf 1927), occurring in moist forests in the Amazon rainforest, but later, Woodson (1951) reported it also for Peru. This is the first record of *Aspidosperma steinbachii* for Brazil, where it is found between southeastern Rondônia and northwestern Mato Grosso states, occurring in forests on hilly terrain (*terra firme* forest) in the Amazon, and in the transition zone between the Amazon and the *Cerrado*.

Phenology: Flowers from July to October and fruits in November.

Conservation status: *Aspidosperma steinbachii* has an AOO of 16 km^2 and is considered endangered according to IUCN guidelines (IUCN 2017). It has only four confirmed records for Brazil (.kml file available at https://figshare.com/s/7922a4239a40c3b300d0).

Nomenclatural notes: According to Melchior (1926), who edited the publication "Plantae Steinbachianae", the material collected by J. Steinbach in Bolivia were managed by herbarium B, among which was the holotype of *Aspidosperma steinbachii*. However, since this specimen was destroyed in 1943, we elected its best-preserved "isotype" as a lectotype, the material "Steinbach 7261" from herbarium K.

Taxonomic notes: *Aspidosperma steinbachii* shares some morphological features with both *A. cruentum* Woodson and *A. melanocalyx* Müll.Arg., but differs from the former mainly by having smaller (7-7.11 vs. 19-22 cm long) and blackish-green (vs. yellow) follicles, and from the latter by its pubescent to glabrous leaves on the abaxial surface (vs. usually velutinous), and by its non-rigid inflorescences (vs. rigid).

2. *Aspidosperma tambopatense* A.H.Gentry, Ann. Missouri Bot. Gard. 71(4): 1075. 1984. Type: PERU. Madre de Dios: Tambopata Reserve, 26 km S of Puerto Maldonado on E side of Rio Tambopata, 12/XI/1979, *G. S. Hartshorn 2421* (holotype: MO [barcode MO-2958528] [digital image!]; isotypes: CR, F [barcode V0421499F] [digital image!], MO [barcode MO-1069092] [digital image!], USM).

Figs. 4, 6.

= *Aspidosperma occidentale* Markgr. (1940: 133), non Malme. Type: BRAZIL. Acre: Rio Acre, IV/1911, *E. H. G. Ule 9700* (syntypes: K [barcode K000587675] [digital image!], MG! [barcode 014536]), nom. illeg., pro syn.

Trees 8-40 m high; trunk straight. Branches cylindrical, not suberous, densely lenticellate, glabrescent to glabrous, brown, with cataphylls; latex white. Leaves alternate,

Figure 5. *Aspidosperma steinbachii* Markgr. **A.** reproductive branch; **B.** flower; **C.** inner part of corolla tube; **D.** detail of calyx and gynoecium; **E.** detail of gynoecium [Photos. A: N. C. Bigio 1101 (RON-photo); B-E: M. G. Silva & J. Maria 3325 (IAN)].

concentrated at the apex of branches; petioles 1.2-2.9 cm long, subcaniculate or flattened on the adaxial surface, not winged, glabrescent to glabrous; blades 6.4-13 × 2.4-5.6 cm, chartaceous, flattened, elliptic or obovate, apex acute or acuminate, base attenuate or oblique, margin entire, base and margin flattened, discolorous, venation eucamptodromous, adaxial surface dull, dark green, glabrous, primary vein immersed, secondary veins flattened, tertiary veins conspicuous, abaxial surface dull, light green, glabrous, primary vein prominent, secondary veins flattened, 16-25 pairs, tertiary veins inconspicuous. Inflorescences 4-5.2 cm long, subterminal, cyme corymbiform, not rigid, glabrescent. Flower buds with corolla lobes not twisted. Flowers 4.4-7.3 mm long; pedicel 0.4-1.9 × 0.5-0.6 mm, tomentose. Calyx

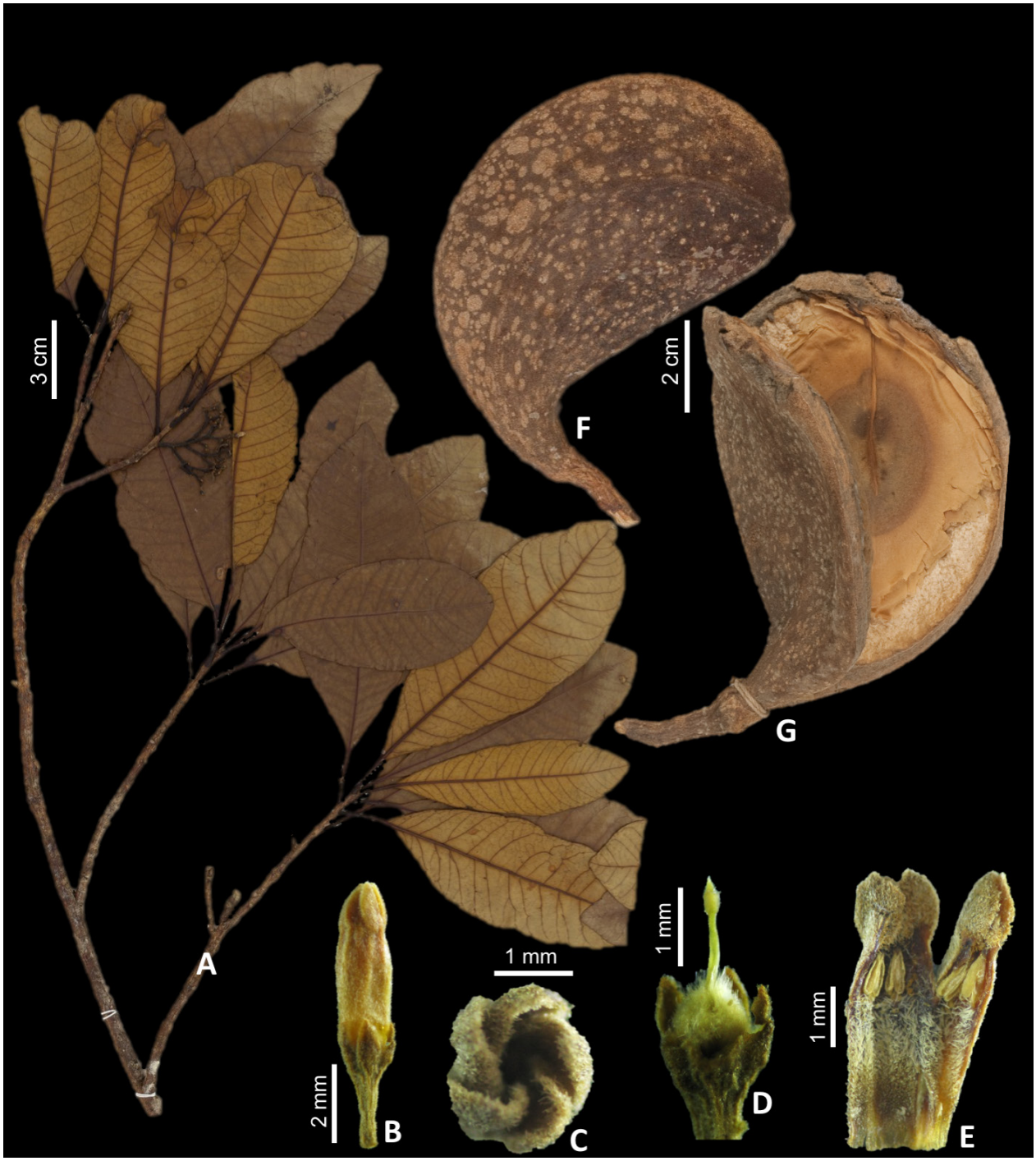

Figure 6. *Aspidosperma tambopatense* A.H.Gentry. **A.** reproductive branch; **B.** flower bud; **C.** corolla lobes; **D.** detail of gynoecium; **E.** inner part of corolla tube; **F.** follicle; **G.** seed [Photos. A: C. A. Cid 3079 (NY-photo); B-E: J. Bosco 112 (UEC); F-G: B. A. Krukoff 5470 (NY-photo)].

1.7-2.6 × 1.2-1.4 mm, campanulate, green, without colleters, tomentose externally, glabrous internally; lobes 5, 0.8-1.2 × 0.4-0.7 mm, equal, deltoid, apex acute. Corolla 3.7-4.7 × 1.2-1.6 mm, tubular, white; tube 3.5 mm long, wall not thickened at the mouth, tomentose externally, pubescent below the insertion of the anthers internally; lobes 5, 0.8-1 × 0.6-0.8 mm, patent, deltoid, apex acute, tomentose. Stamens 5, 2.1-2.6 mm long, included; filaments adnated to the corolla tube, 1.9-2.2 mm long, pubescent; anthers 0.6-0.8 mm long, free from each other and from the style-head, positioned above the style-head, ovate, apex acute, base cordate. Carpels 2, 1.3-2.4 mm long; ovary 0.8 × 0.8 mm, superior, hemisyncarpous, ovoid, tomentose; style 0.3-1 mm long, cylindrical; style-head 0.1-0.3 mm long, main body ellipsoid, with 2 apical appendages, ca. 0.3 mm long, pubescent. Follicles 2 or 1 by abortion, 5.7-7 × 3.7-4.5 cm, flattened, dolabriform, smooth, sessile or substipitate, mucronate, midrib inconspicuous, lenticels conspicuous, brown, glabrescent. Seeds 6.1 cm diam., winged, orbicular, yellow, glabrous; seminal nucleus central, without radial lines, nucleus 2.1 cm diam.

Material examined: BRAZIL. Acre: Brasiléia, Bom Futuro, Reserva Extrativista Chico Mendes, km 52 of Brasiléia-Assis Brasil road, 18 km on ramal (side road) "Tocandeira", 23/IX/2003, *D. C. Daly et al. 11974* (RB); Brasiléia, estrada para Assis Brasil km 8, 1/XI/1980, *C. A. Cid 3079* (INPA); Capixaba, Projeto de Assentamento Extrativista (PAE) São Luis do Remanso, Colocação Estrangeiro, 30 km W of Capixaba, tem 15-21 km N on new unpaved access road, 30/IX/2003, *D. C. Daly et al. 12039* (RB); Cruzeiro do Sul, Rio Juruá, margem esquerda ao lado do Igarapé Viseu, a 5 km da margem, 4/XI/1991, *C. A. Cid Ferreira et al. 10568* (NY-photo); Rio Branco, Campus Universitário, 25/X/1983, *A. Rosas & M. B. Guimarães 32* (INPA); Rio Branco, Campus da UFAC, 22/IX/1989, *J. Bosco 112* (UEC); Sena Madureira, basin of Rio Iaco (tributary of Rio Purus), Fazenda São Jorge I, property of Acre Brasil Verde, timber concession of Laminados Triunfo Ltda., 107 km NW of Rio Branco on BR-264, then ca. 22 km on Toco Preto access road, 5/VII/2008, *D. C. Daly et al. 13179* (RB); [Sena Madureira], near mouth of Rio Macauhan (tributary of the Rio Yaco), 13/VIII/1933, *B. A. Krukoff 5470* (NY-photo); Tarauacá, Reserva Indígena Praia do Carapanã, Rio Tarauacá, river at low water, Seringal União, within proposed Reserva Indígena Praia do Carapanã (Kaxinawá Indians), Seringal Mucuripe, Colocação Remanso, 19/IX/1994, *D. C. Daly et al. 8244* (INPA, NY-photo); Xapuri, Reserva Extrativista "Chico Mendes", Seringal Cachoeira, BR-317, ramal cachoeira 16 km, 14/XI/2009, *H. Medeiros 235* (RB); 45 km from Rio Branco on Rio Branco–Porto Velho road, 9/X/1980, *S. R. Lowrie et al. 447* (INPA, RB).

Additional material examined: BOLIVIA. Pando: Manuripi, Empresa, 7/X/1977, *W. Terceros 1394* (INPA).

Distribution and habitat: *Aspidosperma tambopatense* was originally reported only for Peru, occurring in moist forests along the base of the Andes (Gentry 1984), but later its distribution was found to extend to Bolivia (Parker III & Bailey 1991; Killeen *et al.* 1993). This is the first record of *Aspidosperma tambopatense* for Brazil, being distributed throughout the territory of the state of Acre, occurring mainly in forests on hilly terrain (*terra firme* forest) in the Amazon rainforest, but also in forests on level terrain (*várzea* forest).

Phenology: Flowers from September to December and fruits from October to December.

Conservation status: *Aspidosperma tambopatense* has an AOO of 48 km^2 and is considered endangered according to IUCN guidelines (IUCN 2017). It has 12 confirmed records for Brazil (.kml file available at https://figshare.com/s/cd094331833eedd5d39b).

Nomenclatural notes: During our studies, we realized that *Aspidosperma occidentale* of Markgraf (1940) and *A. tambopatense* of Gentry (1984) represent the same taxon. However, the name *Aspidosperma occidentale* is a later homonym of the validly published name *A. occidentale* of Malme (1927), thus making it an illegitimate name. As a result, we consider *Aspidosperma occidentale* of Markgraf a pro synonym of the validly published name *A. tambopatense*.

Taxonomic notes: *Aspidosperma tambopatense* is similar to *A. williamii* Duarte, mainly in vegetative characteristics, but it can be distinguished by having leaves with flattened secondary veins on both surfaces (vs. prominulous), deltoid corolla lobes (vs. orbicular), and sessile or substipitate follicles (vs. stipitate), with an inconspicuous midrib (vs. conspicuous).

Key to the species of ***Aspidosperma*** *from the Brazilian Amazon*

1. Leaves congested at the apex of branches; buds protected by cataphylls 2
1'. Leaves arranged along the branches; buds not protected by cataphylls 6
2. Leaves with winged petioles; flowers with glabrous ovary ..... *A. multiflorum* (Figs. 7A, 12A)
2'. Leaves without winged petioles; flowers with tomentose ovary 3
3. Leaves glabrescent to glabrous on the abaxial surface 4
3'. Leaves pubescent on the abaxial surface 5

4. Leaves with prominulous secondary veins on both surfaces; flowers with orbicular corolla lobes; follicles stipitate, with a conspicuous midrib ..... *A. williamii* (Figs. 10A-B, 12B)

4'. Leaves with flattened secondary veins on both surfaces; flowers with deltoid corolla lobes; follicles sessile or substipitate, with an inconspicuous midrib ..... *A. tambopatense* (Figs. 6, 12C)

5. Leaves 1.4-1.8× longer than wide, white on the abaxial surface; flowers more than 4 mm long, glabrescent externally; follicles glabrescent, brown ..... *A. subincanum* (Figs. 7B-C, 12D)

5'. Leaves 3× longer than wide, yellow on the abaxial surface; flowers up to 3 mm long, tomentose externally; follicles pubescent, yellow ..... *A. ulei* (Figs. 10C-E, 12E)

6. Leaves with reticulodromous venation; inflorescences leaf-opposed; seed nuclei basal and apical ..... *A. cuspa* (Figs. 7D, 12F)

6'. Leaves with craspedodromous, brochidodromous or eucamptodromous venation; inflorescences axillary, subterminal or terminal; seed nuclei central or lateral 7

7. Leaves with craspedodromous venation 8

7'. Leaves with brochidodromous or eucamptodromous venation 21

8. Leaves with immersed secondary veins on the abaxial surface 9

8'. Leaves with proeminent, prominulous or flattened secondary veins on the abaxial surface 12

9. Branches with white latex; flowers more than 13 mm long, corolla lobes more than 8 mm long, ovary tomentose; seed nuclei with radial lines ..... *A. schultesii* (Figs. 7F-G, 12G)

9'. Branches with red latex; flowers up to 11 mm long, corolla lobes up to 5 mm long, ovary glabrous; seed nuclei without radial lines 10

10. Leaves with crenulate margin; corolla ca. 3 mm wide ..... *A. leucocymosum* (Figs. 10F-G, 12H)

10'. Leaves with entire margin; corolla ca. 2 mm wide 11

11. Leaves canescent on the abaxial surface; follicles yellow ..... *A. obscurinervium* (Figs. 7H-J, 12I)

11'. Leaves glabrous on the abaxial surface; follicles brown ..... *A. desmanthum* (Figs. 10H-J, 12J)

12. Leaves with 39-41 pairs of secondary veins 13

12'. Leaves with 18-34 pairs of secondary veins 14

13. Leaves 2× longer than wide, glabrous on the abaxial surface; inflorescences in corymbiform cymes ..... *A. araracanga* (Figs. 8A-B, 12K)

13'. Leaves 2.6-3.2× longer than wide, velutinous on the abaxial surface; inflorescences in panicles ..... *A. verruculosum* (Figs. 10K-M, 12L)

14. Leaves with prominent, prominulous or flattened secondary veins on the adaxial surface 15

14'. Leaves with immersed secondary veins on the adaxial surface 18

15. Flowers up to 3.5 mm long; follicles pyriform; seeds chartaceous ..... *A. pachypterum* (Figs. 10N-Q, 12M)

15'. Flowers more than 5.2 mm long; follicles dolabriform or suborbicular; seeds membranaceous 16

16. Leaves brown on the abaxial surface, tertiary veins inconspicuous on the adaxial surface; follicles blackish-green ..... *A. steinbachii* (Figs. 5, 12N)

16'. Leaves white on the abaxial surface, tertiary veins conspicuous on the adaxial surface; follicles brown or yellow 17

17. Leaves dark green on the adaxial surface; flowers with corolla lobes ca. 2.5 mm long; follicles brown ..... *A. album* (Figs. 10R-T, 12O)

17'. Leaves olive green or brown on the adaxial surface; flowers with corolla lobes ca. 4 mm long; follicles yellow ..... *A. spruceanum* (Figs. 11A-C, 12P)

18. Flowers with tubular corolla, lobes up to 1.5 mm long ..... *A. eteanum* (Figs. 8C, E, 12Q)

18'. Flowers with salverform corolla, lobes more than 2.5 mm long 19

19. Leaves 2-2.2× longer than wide; flowers with corolla lobes smaller or equal to the tube (0.8-1×) ..... *A. neblinae* (Figs. 11D-F, 12R)

19'. Leaves 2.4-3.8× longer than wide; flowers with corolla lobes larger than the tube (1.1-1.7×) 20

20. Leaf petioles ca. 2.2-4 cm long, tomentose; flowers with corolla tube tomentose below the insertion of the anthers internally ..... *A. sandwithianum* (Figs. 8D, 12S)

20'. Leaf petioles ca. 1.2-2 cm long, pubescent to glabrous; flowers with corolla tube canescent below the insertion of the anthers internally ..... *A. centrale* (Figs. 2, 12T)

21. Leaf margins with deep revolute base 22

21'. Leaf margins with flattened base 24

22. Leaves with eucamptodromous venation ..... *A. auriculatum* (Figs. 11G, 12U)

22'. Leaves with brochidodromous venation 23

23. Branches angular; leaves subopposite or opposite; flowers with glabrous ovary ..... *A. salgadense* (Figs. 11H-I, 12V)

23'. Branches cylindrical; leaves usually alternate; flowers with tomentose ovary ..... *A. oblongum* (Figs. 8F, 12W)

24. Leaves with brochidodromous venation 25

24'. Leaves with eucamptodromous venation 28

25. Branches densely lenticellate; follicles verrucose, with inconspicuous lenticels ..... *A. brasiliense* (Figs. 8G-H, 12X)

25'. Branches sparsely lenticellate; follicles smooth, with conspicuous lenticels 26

26. Leaf petioles more than 2 cm long; follicles botuliform, inflated ..... *A. cylindrocarpon* (Figs. 9A, 12Y)

26' Leaf petioles up to 1.5 cm long; follicles dolabriform or falciform, flattened 27

27. Leaves with 30-38 pairs of secondary veins; flowers up to 9 mm long, calyx with 6-7 lobes ..... *A. darienense* (Figs. 11J-K, 12Z)

27'. Leaves with 23-25 pairs of secondary veins; flowers more than 17 mm long, calyx with 5 lobes ..... *A. inundatum* (Figs. 11L-M, 13A)

28. Leaves more than 20 cm long; flowers with corolla lobes ca. 6 mm long; follicles velutinous ..... *A. myristicifolium* (Figs. 9B, 13B)

28'. Leaves up to 17 cm long; flowers with corolla lobes up to 5 mm long; follicles pubescent to glabrescent 29

29. Leaves with prominent secondary veins on the abaxial surface; follicles more than 11 cm long 30

29'. Leaves with flattened or immersed secondary veins on the abaxial surface; follicles up to 9 cm long 31

30. Leaves glabrescent on the abaxial surface; flowers with tomentose ovary ..... *A. duckei* (Figs. 3, 13C)

30'. Leaves pubescent on the abaxial surface; flowers with glabrous ovary ..... *A. macrocarpon* (Figs. 9C-D, 13D)

31. Leaves usually revolute, velutinous on the abaxial surface; flowers with tomentose ovary ..... *A. carapanauba* (Figs. 9E-F, 13E)

31'. Leaves flattened, pubescent on the abaxial surface; flowers with glabrous ovary 32

32. Flowers with salverform corolla, glabrous externally, lobes equal to or larger than the tube (1-1.6×); follicles suborbicular, smooth ..... *A. rigidum* (Figs. 9G-H, 13F)

32'. Flowers with tubular corolla, tomentose externally, lobes smaller than the tube (0.2-0.5×); follicles dolabriform, verrucose or spinescent 33

33. Inflorescences axillary; flowers with corolla ca. 6 mm long, lobes up to 0.5 mm long ... *A. nitidum* (Figs. 11N-P, 13G)

33'. Inflorescences terminal; flowers with corolla ca. 7.5 mm long, lobes more than 1 mm long 34

34. Leaves coriaceous, 1.7-2× longer than wide; flowers with calyx lobes equal; follicles spinescent ..... *A. excelsum* (Figs. 11Q-S, 13H)

34'. Leaves chartaceous, 2.8-3× longer than wide; flowers with calyx lobes unequal; follicles verrucose ..... *A. marcgravianum* (Figs. 9I-J, 13I)

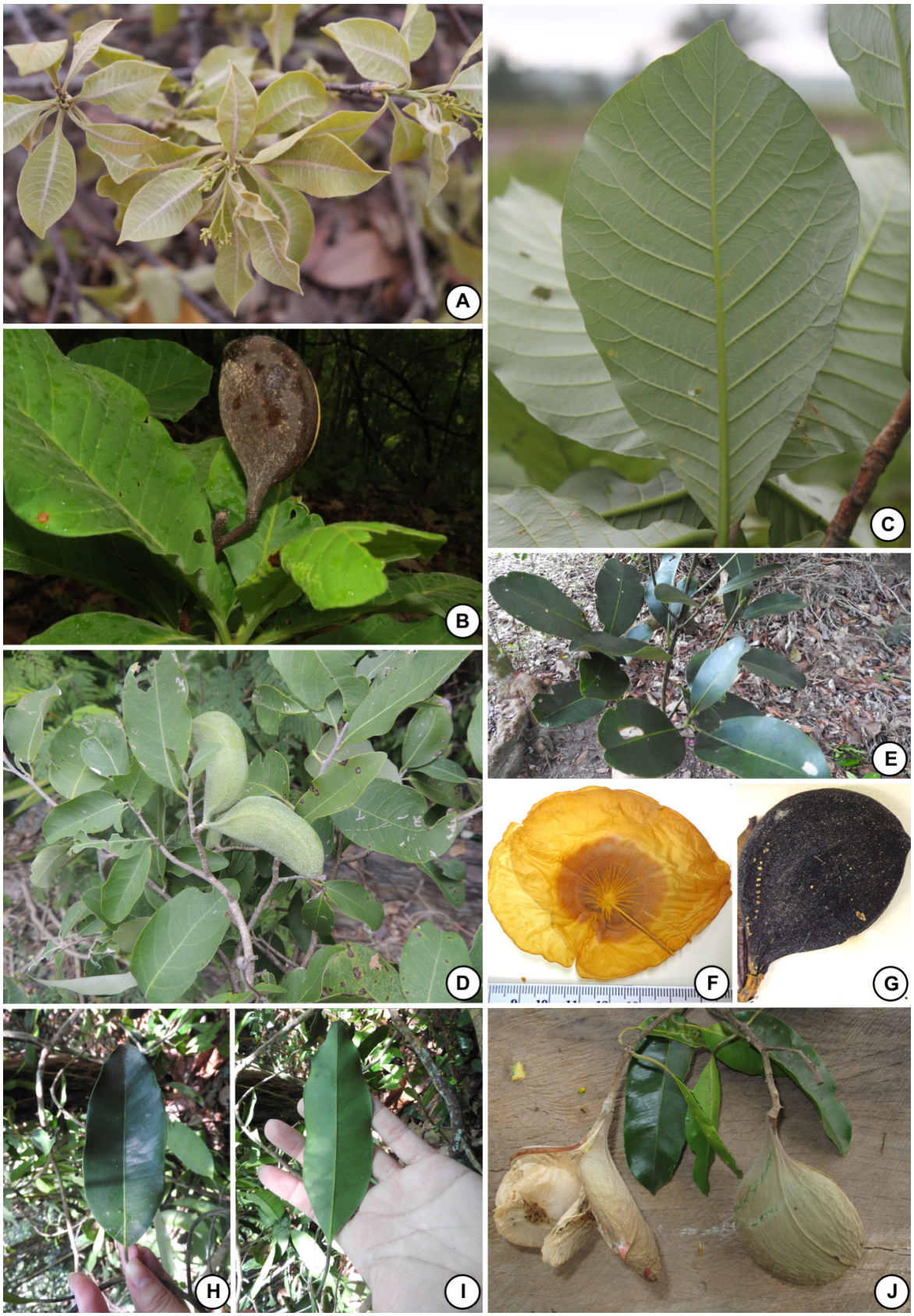

Figure 7. Branches, leaves, fruits and seeds of *Aspidosperma* species from the Brazilian Amazon. **A.** *A. multiflorum* A.DC.; **B-C.** *A. subincanum* Mart.; **D.** *A. cuspa* (Kunth) S.F.Blake; **E-G.** *A. schultesii* Woodson; **H-J.** *A. obscurinervium* Azambuja [Photos. A-C: A. C. D. Castello; D: A. L. Scudeler; E-I: A. S. de S. Pereira; J: D. C. Daly & N. C. Bigio (Herbarium RON archive)].

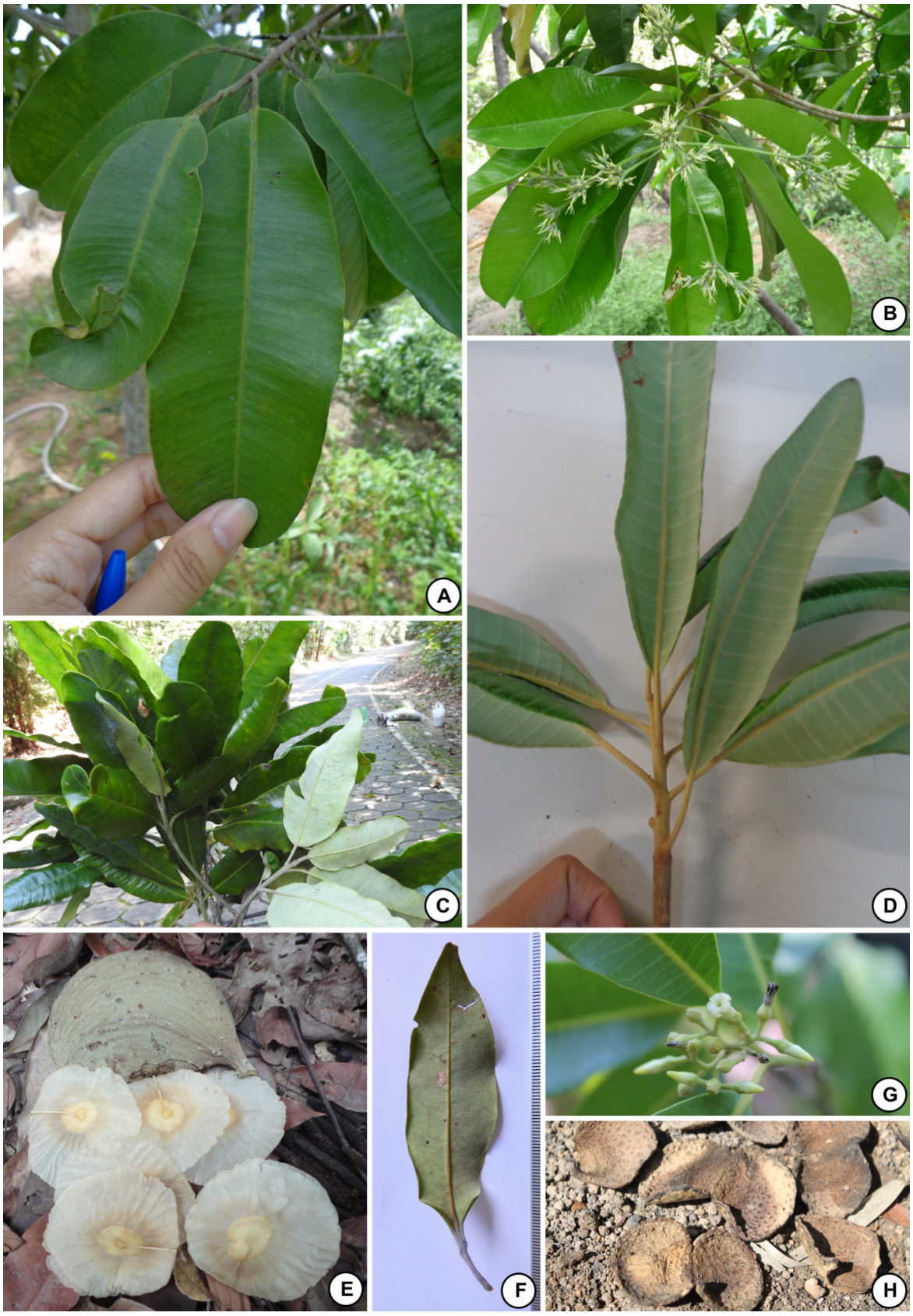

Figure 8. Branches, leaves, fruits and seeds of *Aspidosperma* species from the Brazilian Amazon. **A-B.** *A. araracanga* Marc.-Ferr.; **C, E.** *A. eteanum* Markgr.; **D.** *A. sandwithianum* Markgr.; **F.** *A. oblongum* A.DC.; **G-H.** *A. brasiliense* A.S.S.Pereira & A.C.D.Castello [Photos. A, C-D, F: A. S. de S. Pereira; B: U. Mehlig; E: J. L. L. de Abreu; G-H: A. C. D. Castello].

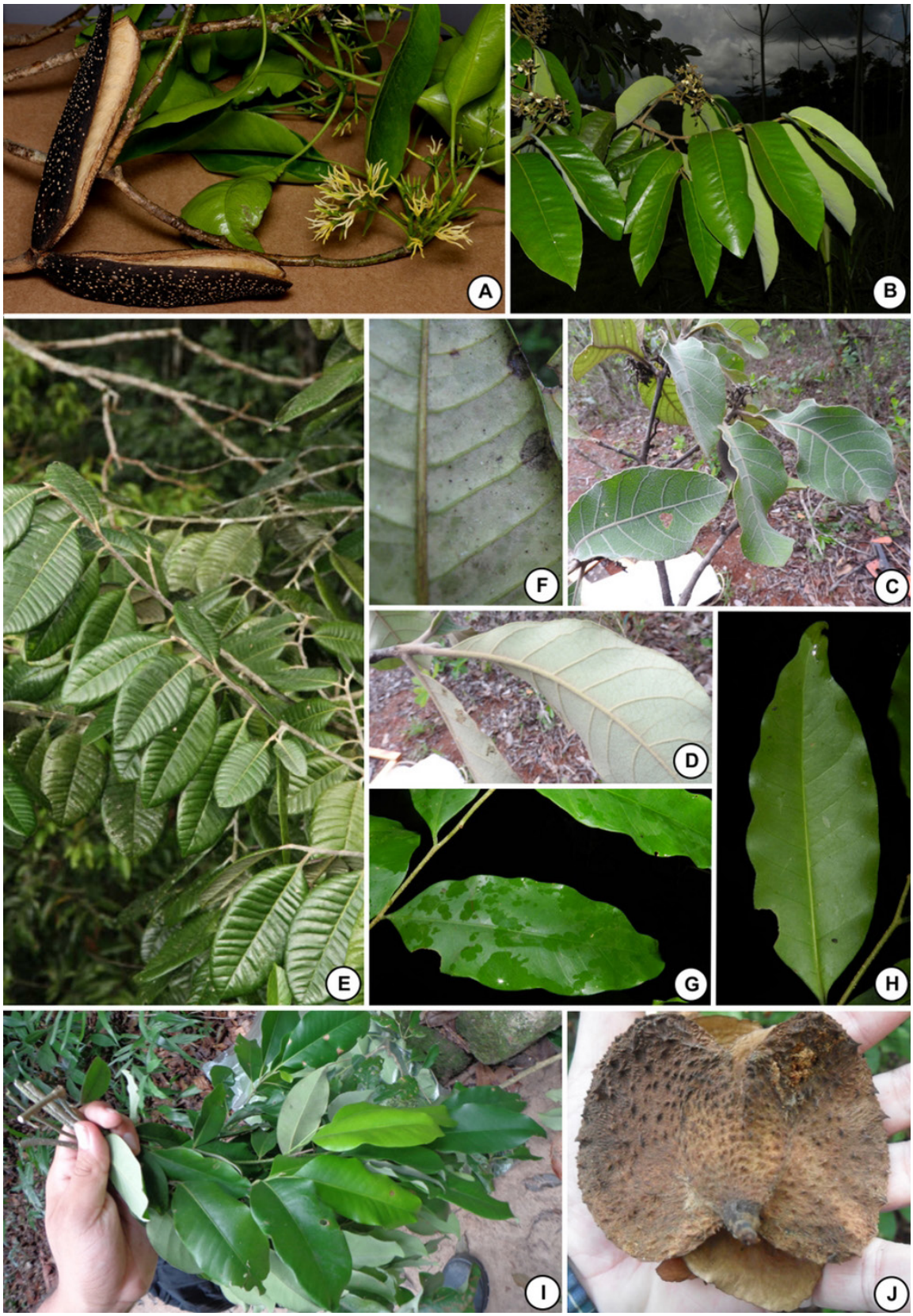

Figure 9. Branches, leaves, fruits and seeds of *Aspidosperma* species from the Brazilian Amazon. **A.** *A. cylindrocarpon* Müll.Arg.; **B.** *A. myristicifolium* (Markgr.) Woodson; **C-D.** *A. macrocarpon* Mart. & Zucc.; **E-F.** *A. carapanauba* Pichon; **G-H.** *A. rigidum* Rusby; **I-J.** *A. marcgravianum* Woodson [Photos. A: E. Y. Kataoka; B, G-H: R. Aguilar; C-D: A. S. de S. Pereira; E: W. Milliken; F: D. Sasaki; I: A. S. de S. Pereira; J: R. C. dos Santos].

Figure 10. Branches, leaves, fruits and seeds of *Aspidosperma* species from the Brazilian Amazon. **A-B.** *A. williamii* Duarte; **C-E.** *A. ulei* Markgr.; **F-G.** *A. leucocymosum* Kuhlm.; **H-J.** *A. desmanthum* Benth. ex Müll.Arg.; **K-M.** *A. verruculosum* Müll.Arg.; **N-Q.** *A. pachypterum* Müll.Arg.; **R-T.** *A. album* (Vahl) Benoist ex Pichon [Photos. A: W. Rodrigues 8978 (RB); B: M. A. Freitas *et al.* 806 (NY-photo); C-D: E. H. G. Ule 8451 (L-photo, U-photo); E: L. Coradin & M. dos R. Cordeiro 914 (CEN); F-G: A. Ducke s.n. (P barcode P00645102-photo); H: G. T. Prance *et al.* 6741 (NY-photo); I: R. Spruce s.n. (E barcode E00259707-photo); J: M. G. Silva & C. Rosario 4031 (NY-photo); K-L: R. Spruce 3328 (TDC-photo); M: A. Ducke s.n. (NY barcode 01172496-photo); N-Q: R. Spruce 3345 (NY-photo, P-photo); R-S: Forest Department of British Guiana 2109 (K-photo); T: L. C. Richard s.n. (P barcode P00645147-photo)].

Figure 11. Leaves and fruits of *Aspidosperma* species from the Brazilian Amazon. **A-C.** *A. spruceanum* Benth. ex Müll.Arg.; **D-F.** *A. neblinae* Monach.; **G.** *A. auriculatum* Markgr.; **H-I.** *A. salgadense* Markgr.; **J-K.** *A. darienense* Woodson ex Dwyer; **L-M.** *A. inundatum* Ducke; **N-P.** *A. nitidum* Benth. ex Müll.Arg.; **Q-S.** *A. excelsum* Benth. [Photos. A-B: R. Spruce 2265 (F-photo); C: M. F. Silva *et al.* 1704 (INPA); D-E: B. Maguire *et al.* 37084 (NY-photo); F: B. Maguire *et al.* 37284 (S-photo); G: A. Ducke s.n. (RB No. 22450); H-I: A. Ducke s.n. (RB No. 22456); J: N. T. Silva 1325 (NY-photo); K: M. J. Pires & N. T. Silva 1390 (MG); L: A. Ducke s.n. (R barcode R000007307); M: A. Ducke s.n. (RB No. 15814); N-O: R. Spruce 1657 (E-photo); P: A. Ducke s.n. (K barcode K000587691-photo); Q-R: R. H. Schomburgk 468 (K-photo); S: B. Maguire 1398 (RB)].

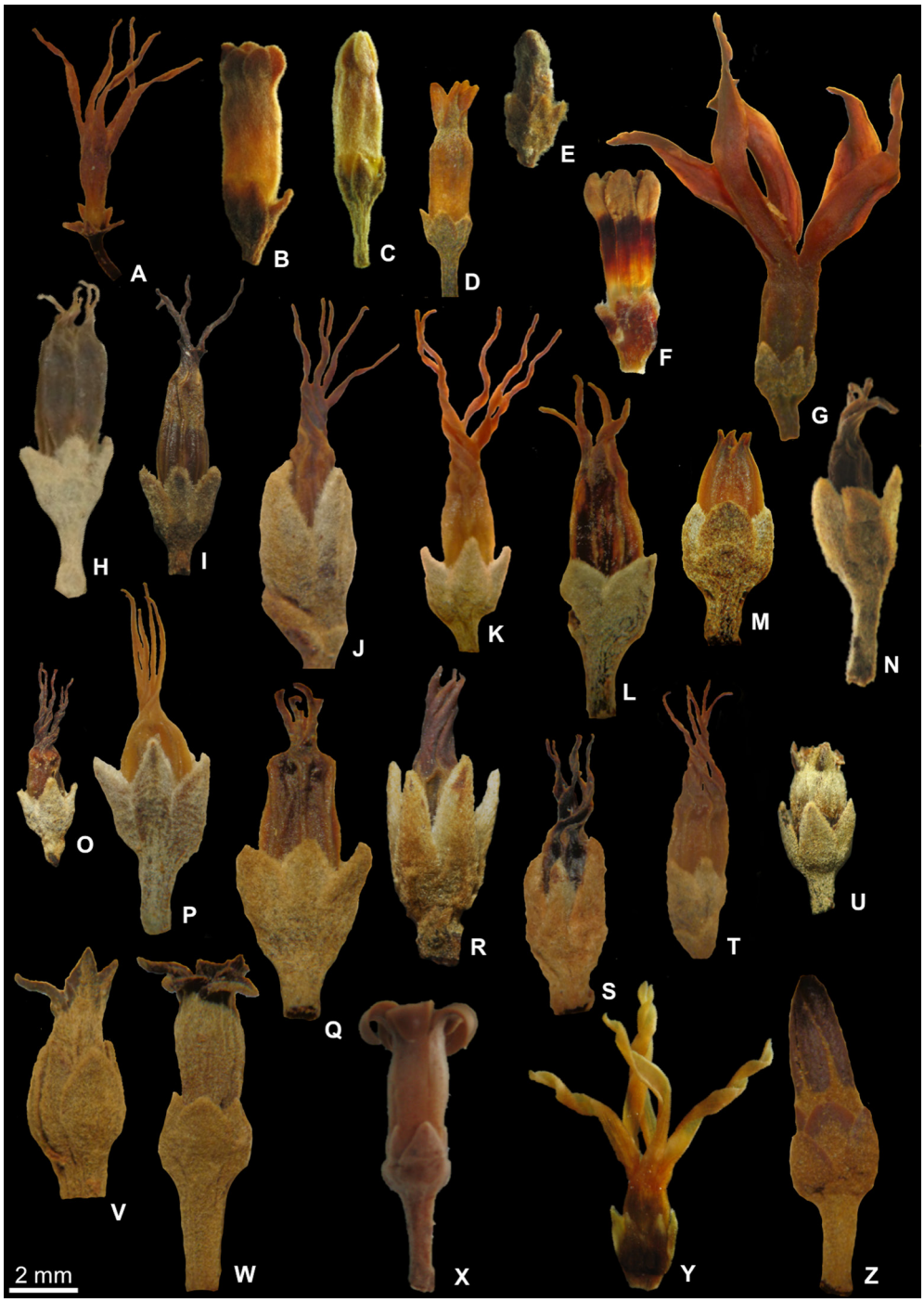

Figure 12. Flowers of *Aspidosperma* species from the Brazilian Amazon. **A.** *A. multiflorum* A.DC.; **B.** *A. williamii* Duarte; **C.** *A. tambopatense* A.H.Gentry; **D.** *A. subincanum* Mart.; **E.** *A. ulei* Markgr.; **F.** *A. cuspa* (Kunth) S.F.Blake; **G.** *A. schultesii* Woodson; **H.** *A. leucocymosum* Kuhlm.; **I.** *A. obscurinervium* Azambuja; **J.** *A. desmanthum* Benth. ex Müll.Arg.; **K.** *A. araracanga* Marc.-Ferr.; **L.** *A. verruculosum* Müll. Arg.; **M.** *A. pachypterum* Müll.Arg.; **N.** *A. steinbachii* Markgr.; **O.** *A. album* (Vahl) Benoist ex Pichon; **P.** *A. spruceanum* Benth. ex Müll. Arg.; **Q.** *A. eteanum* Markgr.; **R.** *A. neblinae* Monach.; **S.** *A. sandwithianum* Markgr.; **T.** *A. centrale* Markgr.; **U.** *A. auriculatum* Markgr.; **V.** *A. salgadense* Markgr.; **W.** *A. oblongum* A.DC.; **X.** *A. brasiliense* A.S.S.Pereira & A.C.D.Castello; **Y.** *A. cylindrocarpon* Müll.Arg.; **Z.** *A. darienense* Woodson & Dwyer [Photos. A: A. M. Miranda *et al.* 5310 (RB); B: A. A. Oliveira *et al.* 111 (ESA); C: J. Bosco 112 (UEC); D: A. T. G. Dias 398 (MG); E: J. M. Pires *et al.* 16800 (UEC); F: B. A. S. Pereira & A. Alvarenga 3638 (UEC); G: N. T. Silva 5375 (MG); H: A. Ducke s.n. (G barcode G00190818-photo); I: P. A. C. L. Assunção & E. da C. Pereira 190 (UEC); J: G. T. Prance *et al.* 5325 (MG); K: J. M. Pires 11911 (RB); L: K. Kubitzki *et al.* P21710 (INPA); M: S. A. Mori & C. Gracie 21790 (INPA); N: M. G. Silva & J. Maria 3325 (IAN); O: N. T. Silva 5157 (MG); P: L. F. Coêlho 538 (MG); Q: A. Ducke s.n. (RB No. 22445); R: B. Maguire *et al.* 42125 (IAN); S: J. M. Pires & N. T. Silva 11907 (IAN); T: E. Soares 221 (INPA); U: J. M. Pires *et al.* 5085 (IAN); V: R. L. Fróes 30286 (IAN); X: A. S. de S. Pereira *et al.* 96 (MG); W: A. L. Scudeler *et al.* 199 (UEC); Y: A. A. Santos *et al.* 1479 (UEC); Z: N. T. Silva 1325 (IAN)].

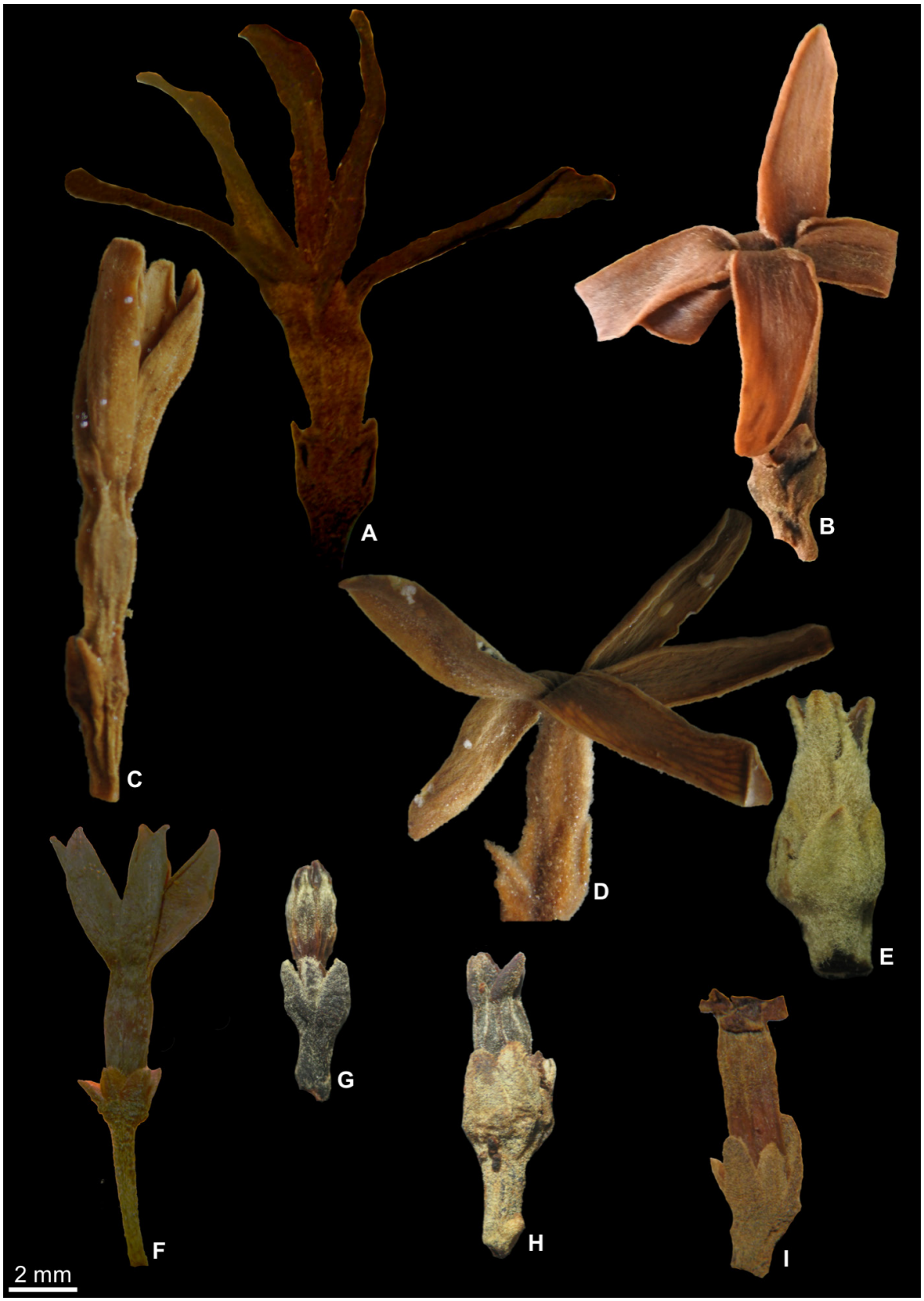

Figure 13. Flowers of *Aspidosperma* species from the Brazilian Amazon. **A.** *A. inundatum* Ducke; **B.** *A. myristicifolium* (Markgr.) Woodson; **C.** *A. duckei* Huber ex Ducke; **D.** *A. macrocarpon* Mart. & Zucc.; **E.** *A. carapanauba* Pichon; **F.** *A. rigidum* Rusby; **G.** *A. nitidum* Benth. ex Müll.Arg.; **H.** *A. excelsum* Benth.; **I.** *A. marcgravianum* Woodson [Photos. A: G. A. Black 48-2946 (IAN); B: C. Figueiredo *et al.* 426 (UEC); C: A. Ducke s.n. (RB No. 11402); D: R. C. Mendonça *et al.* 1616 (UEC); E: G. F. Árbocz 4033 (ESA); F: A. Ducke 2132 (INPA); G: P. Acevedo-Rodríguez *et al.* 8366 (UEC); H: W. W. Thomas *et al.* 5098 (INPA); I: J. M. Pires 7141 (IAN)].

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